4.5 SOIL EXPOSURE PATHWAY

The soil exposure pathway was evaluated on the potential to release. No soil sampling has been conducted at the R-A site.

4.5.1 Target Populations

4.5.1.1 Resident Populations

There are no known residents living on the R-A site or within 200 feet of source areas at the R-A site (USGS 1960). The site is inactive; therefore, no workers are on-site.

4.5.1.2 Nearby Populations

Based on census data for the town of Rico, the Rico division and Dolores County, approximately 84 people live within one mile of the R-A site (USDOC 1990; USGS 1960). There are no restrictions to access of source materials on the site. Access roads lead to mine adits, mills, tailings and ponds with no gates or fencing (EPA 1984b). The R-A site is in a National Forest with high recreational use.

4.5.1.3 Terrestrial Sensitive Environments

The federal candidate species North American wolverine may utilize the site area as habitat (FWS 1994). Several montane riparian sensitive communities are also found in the area (CNHP 1994).

4.5.2 Soil Exposure Pathway Specific Data Gaps

After evaluating all potential site sources and associated nearby population targets, URS has determined that no significant data gaps exist.

Identified the following data gaps with regard to the soil exposure pathway:

- No source sampling has been conducted at the R-A site; and
- ~~Lack of Soil samples~~ No soil sampling has been conducted at the R-A site.

5.0 SUMMARY

The R-A site is an inactive mining area which began operations over 100 years ago as a silver producer. In later periods of operation, base-metal production from sulfide ores and sulfuric acid from pyrite ores were the major goals of the mining operations. The site exists in two areas; The Rico-Argentine Mill, mines and associated tailings piles and ponds on Silver Creek and a sulfuric acid plant, cyanide heap leach pads and settling ponds on the Dolores River. Cyanide heap leaching has been used in two lined ponds with at least one minor release of leachate. All mine water drainage has been routed through underground workings to discharge from the St. Louis Tunnel Adit on the Dolores River. The discharge is treated with slaked lime and is under a Colorado Pollutant Discharge Elimination System permit with input from the EPA's NPDES division. The permit limits have been continuously violated with at least two Notice of Violation and Cease and Desist Orders issued by CDH.

The nearest residents are approximately three-quarters of a mile from the site. There are no restrictions to access to the site. Approximately six residents potentially use groundwater as a drinking water source. Several federally listed threatened and endangered species potentially use the area or exist within the specified target distance limits. Harvestable game fish are taken from the Dolores River within the fifteen-mile downstream target distance limit, but the quantity of fish taken from the river is unknown.

During this evaluation, URS was able to identify the following significant data gaps which exist for the R-A site:

- No source characterization has been conducted (air, surface water and soil exposure pathways);
- Confirmation of harvestable quantities of fish being collected from the Dolores River (surface water pathway);
- Determination of existence of wetlands along the Dolores River (surface water pathway); and
- No soil sampling has been conducted at the R-A site.

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FIGURE 1

Radius of Influence Map

Area

HIGHLIGHTS:

A) IS THERE QUALITATIVE OR QUANTITATIVE EVIDENCE OF A RELEASE TO AIR, SURFACE WATER, GROUNDWATER, OR SURFACE SOIL? DESCRIBE BRIEFLY.
More detail in items GW-1 (for groundwater pathway), SW-5 (for surface water pathway), A-1 (for air pathway), and SE-1 (for soil exposure pathway).

Yes, to surface water. Surface water samples collected for NPDES monitoring repeatedly detect violations of permit standards for several metals. Surface water and sediment samples collected from 1989 through 1993 by the Bureau of Reclamation show metals loading to the drainages.

B) IS THERE EVIDENCE OF AN **IMPACTED** TARGET POPULATION? DESCRIBE.

Pathway	Target	None/target Size	Brief Description	More Discussion In
Groundwater	Public drinking Water supply	None	Three wells within a four-mile radius are listed as household use. No impacts noticed by users.	Section 4.3
	Domestic drinking Water supply	6		
Surface Water	Drinking water	None	CDOW improved aquatic habitat in 1982 which has increased trout populations to harvestable sizes.	Section 4.4
	Fishery ND*	Yes		
	Sens. env. ND	N/A		
Soil Exposure	People within 200'	None	Federal candidate species and state species of concern potentially exist in site area.	Section 4.5
	Terrestrial sens. env. ND	N/A		
Air	Population	None	No air monitoring has been conducted.	Section 4.2

*ND - Not Determined

SITE INFORMATION

G-1. Directions to the site (from nearest easily recognized point).

From Telluride, Colorado, proceed south on State Highway 145, over Lizard Head Pass, approximately 30 miles.

G-2. Are there other potential sources in the neighborhood to be aware of as the site is evaluated? eg. Is the site in an industrial area, near a railroad, along a highway? Are sources with similar contaminants to this site in the vicinity?

No. Site area is heavily mined, site sources are major sources in the area.

Source of information: CDH Files; EPA Files; USGS 1900; USGS 1905; USGS 1974

Background/Operating History

G-3. Describe the operating history of the site:

Early mining began in 1861. Silver production peaked in the 1890s and base-metal ore production peaked in 1927. A sulfuric acid production plant operated from 1955 through 1964. All mining operations ceased in 1971. Cyanide heap leaching occurred from 1973 through the late 1970s. Anaconda Minerals Company owned the property from 1980 to 1988 and explored for molybdenum. Rico Development Corporation owned the property from 1988 to April 1994 when they sold their interests to Azure, Inc., from Phoenix, Arizona. A NPDES permit was obtained in 1976. Frequent violations of the permit have occurred. BOR sampling shows loading of heavy metals to the adjoining surface water drainages.

Source of information: M
ACC 1994; BOM 1915; BOM 1939a; BOM 1939b; BOM 1940; BOM 1942b; BOM 1943; BOM 1949a; BOM 1974; CDH 1988; DOM 1975a; DOM 1975b; DOM 1980; DOM 1981; DOM 1982; DOM 1983; E&E 1984a; E&E 1984b; E&E 1985; E&E 1991a; E&E 1991b.

G-4. Describe site and nature of operations (property size, manufacturing, waste disposal, storage etc.):

See #G-3. Approximate site acreage is 2,500 acres. Sources cover approximately 75 acres. Tailings piles, tailings ponds and settling ponds typical of hardrock mining comprise the source areas.

Source of information: EPA 1984a; EPA 1984b; USGS 1905; USGS 1974; EMD 1994.

G-5. Describe any emergency or remedial actions that have occurred at the site:

None. Anaconda did some environmental work (plugged adits, maintained settling ponds, built water treatment plant) while they owned the property.

Source of information: ACC 1994, CDH files, EPA files.

G-6. Are there records or knowledge of accidents or spills involving site wastes? Are there Emergency Response Notification (ERNs) reports for this location?

None.

Source of information: EPA files.

G-7. Describe existing sampling data and briefly summarize data quality (e.g. sample objective, age/comparability, analytical methods, detection limits, QA/QC, validatability):

Sampling of surface water is conducted periodically for the NPDES permit. Methods and QA/QC are unknown. BOR sampling has been conducted yearly to trace mercury and other metals loading in the Dolores River and its tributaries.

Source of information: BOR 1994, WMD 1994.

G-8. Is there any other local, state or federal regulatory involvement? Describe. Include permits, and names of contact individuals within each government organization.

AGENCY	PROGRAM	CONTACT	PHONE	PERMIT
CDH	NPDES	Kathleen Kalamen	692-3603	CO-0029793

G-9. Attach site sketch or schematic. Include all pertinent features including wells, storage areas, underground storage tanks, source areas, buildings, access roads, areas of ponded water. Refer to figure(s) submitted with text of report if appropriate.

Refer to figures 1 and 2.

SOURCE CHARACTERIZATION

WC-1. Describe each source at the site, on Table 1, in terms of source type, containment, size/area/volume/quantity, and substances present. See HRS Tables 2-5 and 5-2 for source descriptions, Tables 3-2, 4-2, 4-8, 5-6, 6-3, and 6-9 for containment.

WC-2. Briefly describe how waste quantity was estimated (eg. historical records or manifests, permit applications, air photo measurements, etc.):

EPA's sampling team in 1984 estimated the total size and amount of source material on the site.

Source of information: EPA 1984a; EPA 1984b.

WC-3. Describe any restrictions or barriers to accessibility of on-site sources.

None.

Source of information: 1984b.

GROUNDWATER CHARACTERISTICS

GW-1. Any positive or circumstantial evidence of a release to groundwater? Describe.

Yes. Surface water and sediment sampling show metals loading to these media. Valley fill and alluvial material form an unconfined aquifer that potentially interacts with mine water discharge and surface water bodies. No specific groundwater sampling has been conducted other than mine discharge for NPDES monitoring.

Source of information: EPA 1984b; USGS 1900; USGS 1905; USGS 1974; WMD 1994.

GW-2. Any positive or circumstantial evidence of a release to drinking water users? Describe analytes, detection limits, background, hits, number of users, locations, QA/QC.

None reported. Three household use wells are within the four-mile target distance limit and serve approximately six residents. Two of these wells are approximately three-quarters of a mile upgradient. The other is approximately one and one-half miles downgradient. All other drinking water sources are surface water diversions from above the site area.

Source of information: CDH files; EPA files; WMD 1994.

GW-3. Briefly describe the geologic setting.

Alluvial material from wash and landslides masks the underlying geology. A shallow unconfined aquifer exists in the alluvial material. The Cutler Formation is the youngest formation exposed at the site and is at least 2,800 feet thick. Fractures in bedrock forms a deeper aquifer. Geothermal Springs are found in the site area.

GW-4. Describe geologic/hydrogeologic units on Table 2. Give names, descriptions, and characteristics of consolidated and unconsolidated zones beneath the site.

GW-5. Is the site in an area of karst terrain or a karst aquifer?

No.

GW-6. Net Precipitation (per HRS section 3.1.2.2).

4.1 inches.

SURFACE WATER CHARACTERISTICS

SW-1. Mean annual precipitation (per HRS section 4.0.2)= 12.8". If less than 20", then count intermittent channels as surface water.

SW-2. Discuss the probable surface water flow pattern from the site to surface waters:

The tailings piles from the Rico-Argentine Mill are in Silver Creek with tailing ponds apparently draining directly into Silver Creek. The St. Louis Tunnel Adit drains into a slaked lime treatment system and then a series of settling ponds before discharging into the Delores River. This discharge has a NPDES permit.

Source of information: EPA 1984b; WMD 1994.

SW-3. If surface water exists within 2 miles of the site, describe surface water segments within the 15-mile distance limit.

Segment Name	River/Lake/Type	Fresh/Salt Water	Start (mi.)	End (mi.)	Flow In cfs
Dolores River	River	Fresh	0	15	136
Silver Creek	Creek	Fresh	0	.75	N/A

Groundwater to surface water distance N/A Angle Θ ____

SW-4. Provide a schematic diagram or simple figure which describes surface water segments, locates targets, identifies flow direction, PPE(s), etc. Refer to figure(s) submitted with text of report if appropriate.

Refer to figures 1 and 2.

SW-5. Any positive or circumstantial evidence of a release to surface water? Evidence of a release by direct observation? Is the source located in surface water? Describe.

Yes. Tailing piles are placed in Silver Creek and tailings ponds are discharging to Silver Creek. Surface water and sediment samplings performed by BOR in Silver Creek and the Dolores River show metals loading occurring. The NPDES monitoring sampling show repeated exceedances of permit standards for metals.

Source of information: BOR 1994, WMD 1994.

SW-6. Any positive or circumstantial evidence of a release to surface water target populations? Describe analytes, detection limits, background, hits, number of users, locations, QA/QC.

No. An ACC contractor in the 1980s found decreased aquatic life in the Dolores River below the site but could not attribute the situation to the site. No target-specific sampling has been conducted at this site.

Source of information: EPA 1984b.

SW-8. Is the site or portions thereof located in surface water? Yes.

Is the site located in the 1 - ‹10 yr floodplain?

›10-100 yr?

›100-500 yr?

›500 yr?

SW-9. Two-year 24-hour rainfall 1.5"

TARGETS

T-1. Discuss groundwater usage within four miles of the site:

There are no municipal wells within the specified four-mile target distance limit. Five wells are listed by the CSE; one owned by the CDOT for wash water in a maintenance shop, one is listed as industrial use and three are listed as household use. Two of the household wells are approximately three-quarters of a mile upgradient and one is approximately three-quarters of a mile downgradient.

Source of information: CSE 1994, USDOC 1990.

T-2. Summarize the drinking water population served via groundwater within four miles of the site:

0 - 1/4 mi	0
1/4 - 1/2 mi	8.0
1/2 - 1 mi	76
1 - 2 mi	18
2 - 3 mi	~~0~~ 10
3 - 4 mi	~~0~~ 11

Attach calculations for population apportionment in blended systems.

T-3. Identify and locate any of the following surface water targets within 15 miles of the site: drinking water population(s) served by intakes, fisheries, sensitive environments described in Table 4-23 of the HRS, and wetlands as defined in the Federal Register.

Targets	Dist. From Site	SW Body	Flow In cfs	Population Served/Size (Incl. Units)	Contamination Known/Suspected
Montane riparian	4 miles	Dolores River	136	~~N/A~~ ND	Metals
Dolores Fishery	1 mile	Dolores River	136	~~N/A~~ ND	Metals

One surface water diversion is listed as multiple use including domestic. This diversion is the St. Louis Tunnel, actual domestic use is unknown.

T-4. Summarize the population within a four-mile radius of the site:

	Total Pop.	Worker Pop.
on site	0	0
0 - 1/4 mi	0	
1/4 - 1/2 mi	8	
1/2 - 1 mi	76	
1 - 2 mi	18	
2 - 3 mi	10 0	
3 - 4 mi	11 0	

T-5. Identify and locate any terrestrial sensitive environments described in Table 5-5 of the HRS.

Potential habitat for federal candidates species, North American Wolverine and Northern Gas Hawk. Potential habitat for federally listed threatened and endangered Bald Eagle, Peregrine Falcon and Mexican Spotted Owl. Potential habitat for montane riparian forest that is ranked very rare globally and in Colorado.

T-6. Describe any positive or circumstantial evidence of a release to air target populations? Of a release by direct observation where target population exists within 1/4 mile of the site? Describe analytes, detection limits, background, hits, number of users, locations, QA/QC.

No air monitoring has been conducted at this site. No observations are available concerning dust from tailings or ponds blowing offsite.

T-7. Identify and locate any potential or known resident soil exposure populations, if present. Describe conditions which lead the researcher to suspect contaminated soil within 200' of residences, if this condition exists.

None known.

TABLE 1
WASTE CONTAINMENT AND HAZARDOUS SUBSTANCE IDENTIFICATION[1]

SOURCE TYPE	SIZE (Volume/Area)	ESTIMATED WASTE QUANTITY	SPECIFIC COMPOUNDS	CONTAINMENT[2]	SOURCES OF INFORMATION
Tailing piles, ponds	75 acres	400,000 tons	Heavy metals, cyanide	None	CDH files; EPA files
Mine Adits		1.5 Million Gallons Per Day	Heavy metals	Lime treatment system	WMD files.

1 Use additional sheets if necessary.

2 Evaluate containment of each source from the perspective of each migration pathway (e.g., groundwater pathway - non-existent, natural or synthetic liner, corroding underground storage tank; surface water - inadequate freeboard, corroding bulk tanks; air - unstabilized slag piles, leaking drums, etc.)

TABLE 2
HYDROGEOLOGIC INFORMATION[1]

STRATA NAME/DESCRIPTION	THICKNESS (ft.)	HYDRAULIC CONDUCTIVITY (cm/sec)	TYPE OF DISCONTINUITY[2]	SOURCE OF INFORMATION
Alluvial Fill	10-40	10^{-2}	None	EPA 1984b; Office of the Federal Register 1990; USGS 1900; USGS 1905; USGS 1974
Bedrock (Cutler and older Formations)	› 2,800	10^{-5}	None	EPA 1984b; Office of the Federal Register 1990; USGS 1900; USGS 1905; USGS 1974

[1] Use additional sheets if necessary.

[2] Identify the type of aquifer discontinuity within four-miles from the site (e.g., river, strata "pinches out", etc.).

SITE INSPECTION PRIORITIZATION INDEX

1) Site Historical Information

- reports, correspondence, press clippings, interviews, maps, schematics, permits, ownership records, waste characteristics, analytical data

2) Correspondence

3) Field Information

- log books, site access agreements, photographs and negatives, field sampling plan

4) Health and Safety

- site health and safety plan, MSDS

5) General Site Characterization

- geology, hydrology, hydrogeology, meteorology, maps

6) Interpretative or Final Reports

7) Target Information

- ground water users, surface water users, population data, wetlands maps, land use maps, wind roses

8) QA/QC

41881
Index-SIP:mjl

41881 41-10-B1012 FROM: U.S. DEPT. TO: URS SUBJ: INFO RE NEW OWNERS OF RICO DEVELOPMENT CORP'S HOLDINGS
DATE: MAY 25, 1994 OF AG.

41881 41-10-B1014 FROM: COLORADO TO: PUBLIC SUBJ: INSPECTOR'S DAILY REPORTS/INFORMATION REPORTS/OPERATOR'S ANNUAL
DATE: 1915-1983 BUREAU OF MINES REPORTS

41881 41-10-B1013 FROM: CDH TO: PUBLIC SUBJ: SITE INFORMATION FROM COLORADO DEPT OF HEALTH FILES
DATE: 1984-1988

41881 41-20-B1027 FROM: URS TO: EPA SUBJ: LETTER RE CLOSEOUT AND TRANSFER OF FILES
DATE: JAN 20, 1994

41881 41-30-B1015 FROM: URS TO: URS SUBJ: LOGBOOK #268 (CARR)
DATE: MARCH 1994
NOTES: 40 PAGES

41881 41-50-B1016 FROM: CDH TO: PUBLIC SUBJ: CLASSIFICATIONS AND NUMERIC STANDARDS FOR SAN JUAN RIVER AND DOLORES
DATE: SEPT 27, 1993 RIVER BASINS

41881 41-50-B1020 FROM: USGS TO: PUBLIC SUBJ: EXCERPTS FORM "GEOGRAPHY AND GENERAL GEOLOGY OF THE RICO QUADRANGLE"
DATE: 1905

41881 41-50-B1018 FROM: U.S. DEPT. TO: PUBLIC SUBJ: EXCERPTS FROM "GEOLOGY AND ORE DEPOSITS OF THE RICO DISTRICT"
DATE: AUG 1974 OF INTERIOR

41881 41-50-B1019 FROM: USGS TO: PUBLIC SUBJ: EXCERPTS FROM "GEOLOGY OF THE RICO MOUNTAINS, COLORADO"
DATE: 1900

41881 41-50-B1017 FROM: STATE OF TO: PUBLIC SUBJ: RECONNAISSANCE ENGINEERING GEOLOGY REPORT FOR PLANNING DISTRICT 9
DATE: AUG 4, 1975 COLORADO

41881 41-60-B1028 FROM: URS TO: URS SUBJ: CERCLA ELIGIBILITY WORKSHEET
DATE: MARCH 1994

41881 41-70-B1026 FROM: STATE OF TO: PUBLIC SUBJ: COLORADO WELLS, APPLICATIONS AND RESOURCES/WATER RIGHTS REPORT
DATE: APRIL 6, 1994 COLORADO

41881 41-70-B1025 FROM: U.S. CENSUS TO: PUBLIC SUBJ: HOUSEHOLD, FAMILY AND GROUP QUARTERS CHARACTERISTICS/LAND AREA AND
DATE: 1990 BUREAU POPULATION DENSITY

41881 41-70-B1023 FROM: U.S. DEPT TO: URS SUBJ: INFO RE FEDERALLY LISTED SPECIES NEAR SITE
DATE: MAY & JUNE 1994OF INTERIOR

41881 41-70-B1024 FROM: COLORADO TO: URS SUBJ: INFO RE SIGNIFICANT NATURAL COMMUNITIES AND RARE, THREATENED OR
DATE: APRIL 13, 1994 NATURAL HERITAGE ENDANGERED SPECIES
PROGRAM

41881 41-70-B1022 FROM: STATE OF TO: URS SUBJ: INFO RE STATE SENSITIVE WILDLIFE SPECIES NEAR SITE
DATE: JUNE 6, 1994 COLORADO

41881 41-70-B1021 FROM: U.S. DEPT TO: URS SUBJ: WATER QUALITY AND SEDIMENT DATA ON THE DOLORES RIVER
DATE: MAY 25, 1994 OF INTERIOR

41881 41-80-B0662 FROM: URS TO: EPA SUBJ: REV 0: SITE INSPECTION PRIORITIZATION/RICO-ARGERNTINE, RICO,
DATE: OCT 11, 1994 COLORADO
NOTES: 1 VOL

PROJECT FILE

FILE NAME CLOSEOUT **JOB NUMBER** 41881.41 **FILE NUMBER** ALL

SITE NAME SITE INSPECTION PRIORITIZATION: RICO-ARGENTINE, RICO, COLORADO

SITE MANAGER MICHAEL V. CARR

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5/25/94

Mike,

As you requested here is a copy of the business cards of the folks who just bought all of Rico Development Corporation's holdings. Mike Theile would be your contact if you want the specific date the transaction took place. Feel free to call me if you have any other questions.

Nancy McGarigal
303-882-7296